



# CIVL2301

## Structural Analysis

Session 2, In person-scheduled-weekday, North Ryde 2022

*School of Engineering*

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## General Information

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Credit points

10

Prerequisites

CIVL1001

Corequisites

Co-badged status

### Unit description

In this unit, students will be introduced to different aspects of mechanics of solids and structural analysis of trusses, beams and frames. This provides the students with the skills to analyse structures as a foundation skill to different structural designs. Students will develop their understanding of the physical performance of solid structural members, which are associated with a variety of structural systems in Civil Engineering. They also gain an understanding of the theory and application of structural analysis as it applies to trusses, beams and frames. Specific topics include basic concept of deformation compatibility; stresses and strains in structural elements, states of stress such as shear, bending, and torsion, displacements and deformations, energy methods for bar and beam structures; simple buckling; deformation of simple frames and cell box beams, response of linear elastic structures under different mechanical and environmental effects, and structural behaviour considering the distribution of internal forces.

This unit provides an essential foundation for subsequent structural design subjects such as Structural Design 1 and Structural Design 2 in the third year

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

**ULO1:** Convey a sound knowledge of the theory, concepts, and principles in solid mechanics

**ULO2:** Analyse reactions, axial forces, bending moments, shear forces, deflection, and stresses in structural elements and systems

**ULO3:** Perform qualitative and quantitative structural analysis and structural behaviour of different vertical and lateral loads

**ULO4:** Report the structural analysis process and outcomes to a professional standard in both oral and written forms

## General Assessment Information

### Grading and passing requirements for unit

In order to pass this unit, a student must obtain a mark of 50 or more for the unit (i.e. obtain a passing grade P/ CR/ D/ HD).

For further details about grading, please refer below in the policies and procedures section.

If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled

by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

### Hurdle Requirements

Participation in tutorial/practical sessions is a hurdle requirement and students are required to attend at least 10/12 tutorial/practical sessions to pass this unit.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Regular problem sets</a>	20%	No	Weekly
<a href="#">Practical Report</a>	20%	No	Weeks 3, 5, 9 and 12
<a href="#">Final Examination</a>	40%	No	TBA
<a href="#">Mid session quiz</a>	20%	No	Week 8

### Regular problem sets

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 14 hours

Due: **Weekly**

Weighting: **20%**

Students will be provided with regular problem sets to complete. Five in total

On successful completion you will be able to:

- Convey a sound knowledge of the theory, concepts, and principles in solid mechanics
- Analyse reactions, axial forces, bending moments, shear forces, deflection, and stresses in structural elements and systems
- Perform qualitative and quantitative structural analysis and structural behaviour of different vertical and lateral loads

### Practical Report

Assessment Type <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 14 hours

Due: **Weeks 3, 5, 9 and 12**

Weighting: **20%**

Report on practical work completed, including written and oral report.

On successful completion you will be able to:

- Convey a sound knowledge of the theory, concepts, and principles in solid mechanics
- Analyse reactions, axial forces, bending moments, shear forces, deflection, and stresses in structural elements and systems
- Perform qualitative and quantitative structural analysis and structural behaviour of different vertical and lateral loads
- Report the structural analysis process and outcomes to a professional standard in both oral and written forms

## Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 28 hours

Due: **TBA**

Weighting: **40%**

Final examination assessing content throughout semester

On successful completion you will be able to:

- Convey a sound knowledge of the theory, concepts, and principles in solid mechanics
- Analyse reactions, axial forces, bending moments, shear forces, deflection, and stresses in structural elements and systems
- Perform qualitative and quantitative structural analysis and structural behaviour of different vertical and lateral loads

## Mid session quiz

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 13 hours

Due: **Week 8**

Weighting: **20%**

Mid session quiz

On successful completion you will be able to:

- Convey a sound knowledge of the theory, concepts, and principles in solid mechanics
- Analyse reactions, axial forces, bending moments, shear forces, deflection, and stresses in structural elements and systems

<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

Lectures 2 hours, weekly, and notes are provided in iLearn.

SGTAs 1 hour weekly

Practicals 2 hours weekly

References:

Fundamentals of Structural Analysis, Leet 5e, McGraw Hill

Statics and Mechanics of Materials, Beer 3e, McGraw Hill

## Unit Schedule

Refer to iLearn and lecture notes for the unit schedule.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study

- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Changes from Previous Offering

The changes from the previous offering are:

Lectures, SGTAs and Practicals are in-person on campus.

See hurdle requirements for participation in SGTAs and Practical classes.

## Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	1, 2, 3
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	1, 2
	1.3 In-depth understanding of specialist bodies of knowledge	2, 3, 4
	1.4 Discernment of knowledge development and research directions	4
	1.5 Knowledge of engineering design practice	1, 2, 3
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	1, 3, 4
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	3, 4
	2.2 Fluent application of engineering techniques, tools and resources.	3, 4
	2.3 Application of systematic engineering synthesis and design processes.	1, 3



	2.4 Application of systematic approaches to the conduct and management of engineering projects.	3, 4
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	2, 4
	3.2 Effective oral and written communication in professional and lay domains.	3, 4
	3.3 Creative, innovative and pro-active demeanour.	3, 4
	3.4 Professional use and management of information.	1, 2
	3.5 Orderly management of self, and professional conduct.	1, 4
	3.6 Effective team membership and team leadership	1, 4

## Late Assessment Submission Policy

### Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7<sup>th</sup> day (including weekends). After the 7<sup>th</sup> day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

In this unit, late submissions will be accepted as follows:

- Assessments 1 and 2 – YES, Standard Late Penalty applies
- Assessments 3 and 4 - NO, unless Special Consideration is Granted